General

Guideline Title

SOLUTIONS® wound care algorithm.

Bibliographic Source(s)

ConvaTec. SOLUTIONSÂ® wound care algorithm. Princeton (NJ): ConvaTec; 2013 Sep. 16 p. [103 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: ConvaTec. SOLUTIONS wound care algorithm. Princeton (NJ): ConvaTec; 2008. 8 p.

Recommendations

Major Recommendations

Levels of evidence (A-C) are defined at the end of the "Major Recommendations" field.

The recommendations for wound care are presented in the form of 8 algorithms provided at the ConvaTec Web site. Each algorithm corresponds to one of the following observed wound assessments:

- Dry wound, minimal moisture: ≤25% necrotic tissue/fibrin slough
- Dry wound, minimal moisture: >25% necrotic tissue/fibrin slough
- Moist-lightly exuding: ≤25% necrotic tissue/fibrin slough
- Moist-lightly exuding: >25% necrotic tissue/fibrin slough
- Moist-moderately exuding: ≤25% necrotic tissue/fibrin slough
- Moist-moderately exuding: >25% necrotic tissue/fibrin slough
- Wet-heavily exuding: ≤25% necrotic tissue/fibrin slough
- Wet-heavily exuding: >25% necrotic tissue/fibrin slough

The following recommendations support the goal of Solutions Algorithms:

- To facilitate health care professionals' decision making by providing stepwise management and evaluation strategies for acute and chronic would care
- To reduce patient risk factors for delayed wound healing and prevent wound complications

Goals, Guideline, and Outcomes of Patient Care

1. For all chronic or acute wound care patients goals of patient care include reducing risk factors for ulcer development and delayed healing and preventing wound complications and promoting healing in addition to providing local wound care (Adam et al., 2003; Alexanderhouse Group, 1992; Kerstein, 1996; de Laat, Scholte op Reimer, & van Achterberg, 2005; Lewis & Lipp, 2012; Association for the Advancement of Wound Care [AAWC], "Association for the Advancement of Wound Care [AAWC] venous ulcer guideline," 2010; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
2. For all chronic or acute wounds, reâ€evaluate plan of care or address underlying etiology if the wound has not decreased in area during 2 to 4 weeks of care (Arnold et al., 1994; Kantor & Margolis, 1998, 2000; Phillips et al., 2000; Sheehan et al., 2003; van Rijswijk, 1993; van Rijswijk & Polansky, 1994). [Level A]
3. Include the following as goals of pressure ulcer patient care:
    a. Reduce risk factors identified by individual items on Braden Risk Scale (Bolton, 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
    b. Prevent complications (Agency for Health Care Policy and Research [AHCPR], 1992; Lyder et al., 2002) and promote healing (Bergstrom et al., 1994; Kerstein et al., 2001; Kobza & Scheurich, 2000; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
4. Include the following as goals of acute wound patient care:
    a. Prevent complications and promote healing (Franz, Steed, & Robson, 2007; Langemo & Brown, 2006; McIsaac, 2005). [Level C]
5. Include measures to prevent pressure ulcer development and delayed healing in patient care plan:
    a. Minimize effect of risk factors for the development of pressure ulcers and delayed healing (e.g., pressure, shear, friction, nutritional deficiencies, dehydration and dry skin conditions, skin exposure to moisture or wound contamination secondary to incontinence, perspiration or other fluids) (Lyder et al., 2002; AHCPR, 1992; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level C]
    b. For pressure ulcers or acute wounds confirm and treat infection if needed (Gardner et al., 2006; Franz, Steed, & Robson, 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level C]
    c. Assess and manage wound odor (Bergstrom et al., 1994; Gardner, Frantz, & Doebbeling, 2001; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level C]
    d. Assess and manage wound pain (Bergstrom et al., 1994; Gardner, Frantz, & Doebbeling, 2001; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level C]
6. Include the following as expected outcomes for acute wound or pressure ulcer patient care:
    a. Wound is not infected and is healing as evidenced by a reduction in size after 2 to 4 weeks of care (Kantor & Margolis, 1998; van Rijswijk & Polansky, 1994; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
    b. No evidence of additional skin breakdown (Gardner, Frantz, & Doebbeling, 2001; Franz, Steed, & Robson, 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level C]
7. Include the following as goals of venous ulcer patient care:
    a. Reduce risk factors for the development of venous ulcers and delayed healing, such as lower leg edema (O'Meara et al., 2012; Duby et al., 1993). [Level A]
    b. Prevent complications and promote healing (Bolton et al., 2004; Bolton et al., 2006; Kerstein, 1996; Kobza & Scheurich, 2000; McIsaac, 2005). [Level A]
8. Include measures to prevent venous ulcer development and delayed healing in patient care plan:
    a. To reduce risk factors, order lower leg elevation (AAWC, 2005) [Level C], ambulation (AAWC, 2005) [Level C] and compression (O'Meara et al., 2012). [Level A] If patient is not ambulatory, assure frequent ankle flexes. [Level C]
    b. Review surgical and medical management options (AAWC, 2005) [Level A] and use compression bandages if appropriate (O'Meara et al., 2012). [Level A]
    c. Provide patient and/or caregiver teaching and support (AAWC, 2005). [Level A]
    d. Confirm and treat infection if needed (Gardner, Frantz, & Doebbeling, 2001). [Level C]
    e. Assess and manage wound pain (Arnold et al., 1994; Charles, 2002; Charles et al., 2002; Harding et al., 2001; Polignano, Guarnera, & Bonadeo, 2004). [Level A]
    f. Assess and manage wound odor (Cordts et al., 1992; Jørgensen et al., 2005; Ashton, 2004). [Level A]
9. Include the following as expected outcomes for venous ulcer patient care:
    a. Wound is not infected and healing as evidenced by a reduction in size after 2 to 4 weeks of care (Kantor & Margolis; 1998; Phillips et al., 2000; van Rijswijk, 1993; AAWC, "Association for the Advancement of Wound Care [AAWC] venous ulcer guideline," 2010). [Level A]

b. No evidence of new skin breakdown (Gardner, Frantz, & Doebbeling, 2001). [Level C]

10. Include the following as goals of patient care for mixed arterial/venous ulcers:
    a. Reduce risk factors for the development of mixed arterial/venous ulcers and delayed healing (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    b. Prevent complications and promote healing (McIsaac, 2005). [Level C]
11. Include measures to prevent mixed arterial/venous ulcer development and delayed healing in patient care plan:
    a. Reduce risk factors (e.g., smoking, hypertension, inactivity, hyperlipidemia, hyperglycemia) (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    b. Review surgical/medical management options to improve arterial circulation and compression bandages if appropriate (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    c. Provide patient and/or caregiver teaching and support (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    d. Confirm and treat infection if needed (Gardner, Frantz, & Doebbeling, 2001; Gardner et al., 2006). [Level B2]
    e. Assess and manage wound pain (Daniels et al., 2002; Koksal & Bozkurt, 2003; Phillips et al., 1994; Quintanal, 1999). [Level B1]
    f. Assess and manage wound odor (Gardner, Frantz, & Doebbeling, 2001). [Level C]
12. Include the following as expected outcomes for patient care plan of mixed arterial/venous ulcers:
    a. Wound is not infected and is healing as evidenced by a reduction in size after 2 to 4 weeks of care (Kantor & Margolis; 1998; Phillips et al., 2000; van Rijswijk, 1993). [Level A]
    b. No evidence of additional skin breakdown (Gardner, Frantz, & Doebbeling, 2001). [Level C]
13. Include the following as goals of patient care for arterial ulcers:
    a. Reduce risk factors for the development of arterial ulcers and delayed healing (Hopf et al., 2006; Tesfaye et al., 2005; National Clinical Guideline Centre, 2012). [Level C]
    b. Prevent complications and promote healing (Hopf et al., 2006). [Level C]
14. Include measures to prevent arterial ulcer development and delayed healing in patient care plan:
    a. Reduce risk factors (e.g., smoking, hypertension, inactivity, hyperlipidemia, hyperglycemia) (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    b. Review surgical/medical management options to improve circulation (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    c. Provide patient and/or caregiver teaching and support (Kerstein, 1996; National Clinical Guideline Centre, 2012). [Level C]
    d. Confirm and treat infection if needed (Gardner, Frantz, & Doebbeling, 2001; Gardner et al., 2006). [Level B]
    e. Assess and manage wound pain (Daniels et al., 2002; Koksal & Bozkurt, 2003; Phillips, et al., 1994; Quintanal, 1999; Golinko et al., 2009). [Level B]
    f. Assess and manage wound odor (Gardner, Frantz, & Doebbeling, 2001). [Level C]
15. Include the following as expected outcomes for patient care plan of arterial ulcers:
    a. Wound is not infected and is healing as evidenced by a reduction in size after 2 to 4 weeks of care (Kantor & Margolis; 1998; Phillips et al., 2000; van Rijswijk, 1993). [Level A]
    b. No evidence of additional skin breakdown (Gardner, Frantz, & Doebbeling, 2001). [Level C]
16. Include the following as goals of patient care for diabetic foot ulcers:
    a. Reduce risk factors for the development of diabetic foot ulcers and delayed healing (Registered Nurses' Association of Ontario [RNAO], 2005; Frykberg et al., 2006; Brem et al., 2006). [Level C]
    b. Prevent complications and promote healing (RNAO, 2005; Frykberg et al., 2006; Kobza & Scheurich, 2000; McIsaac, 2005). [Level C]
17. Include measures to prevent diabetic foot ulcer development and delayed healing in patient care plan:
    a. Reduce risk factors (e.g., smoking, hypertension, obesity, hyperlipidemia and high blood glucose levels) (Kerstein, 1996; Frykberg et al., 2006; Brem et al., 2006; Wound, Ostomy, and Continence Nurses Society [WOCN], 2012). [Level C]
    b. Review surgical/medical management options and use appropriate offâ€loading techniques (Lewis & Lipp, 2012; Kerstein, 1996; Frykberg et al., 2006, Brem et al., 2006). [Level B]
    c. Provide patient and/or caregiver teaching and support (Kerstein, 1996; Frykberg et al., 2006; Brem et al., 2006). [Level C]
    d. Confirm and treat infection or osteomyelitis, if needed (Frykberg et al., 2006; Brem et al., 2006; WOCN, 2012). [Level C]
    e. Assess and manage wound pain, if relevant (Frykberg et al., 2006; Brem et al., 2006; WOCN, 2012). [Level C]
    f. Assess and manage wound odor (Frykberg et al., 2006; Brem et al., 2006). [Level C]
18. Include the following as expected outcomes for patient care plan of diabetic foot ulcers:
    a. Wound is not infected and is healing as evidenced by a reduction in size after 2 to 4 weeks of care (Kantor & Margolis, 1998; Phillips et al., 2000; van Rijswijk, 1993; Sheehan et al., 2003). [Level A]
    b. No evidence of additional skin breakdown (Gardner, Frantz, & Doebbeling, 2001; Brem et al., 2006). [Level C]

Wound Assessment/Debridement/Treatment

1. For all acute and chronic wounds assess wound bed exudate, tissue types (granulation, epithelization, necrotic tissue or fibrin slough), wound dimensions (length, width and depth), and wound edges and surrounding skin (Bates Jensen, 1997; Bolton et al., 2004; Kantor & Margolis, 1998, 2000; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
2. Assess for clinical signs and symptoms of infection if the patient has an acute or chronic wound (including pressure, venous, arterial, mixed arterial/venous or diabetic foot ulcer) and patient assessment reveals any of the following: elevated temperature, purulent exudate, foul purulent wound exudate, increasing wound pain, cellulitis, increasing wound size, undermining of the wound or peripheral wound induration (Thomson & Smith, 1994; Dow, 2003; Brem et al., 2006; Golinko et al., 2009; Gardner, Frantz, & Doebbeling, 2001; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level B]
3. Debride pressure ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options: a) autolytic, b) enzymatic, c) surgical or sharp, d) other (Bergstrom et al., 1994; Burgos et al., 2000; Kerstein et al., 2001; RNAO, 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010). [Level A]
4. Alert clinicians that an assessment has not been performed in 2 weeks:
    a. For pressure ulcer patient risk assessment (AHCPR, 1992; RNAO, 2005; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level C] or
    b. For pressure ulcer wound assessment (Bergstrom et al., 1994; RNAO, 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level C]
5. Debride venous ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options:
    a. Autolytic (AAWC, "Association for the Advancement of Wound Care [AAWC] venous ulcer guideline," 2010) [Level A]
    b. Enzymatic (AAWC, "Association for the Advancement of Wound Care [AAWC] venous ulcer guideline," 2010) [Level B]
    c. Surgical (AAWC, "Association for the Advancement of Wound Care [AAWC] venous ulcer guideline," 2010) [Level C]
    d. Other (Bradley, Cullum, & Sheldon, 1999) [Level C]
6. Debride mixed arterial/venous ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options:
    a. Autolytic (Mulder, 1995)
    b. Enzymatic
    c. Surgical
    d. Other (Bradley, Cullum, & Sheldon, 1999) [Level C]
7. Debride arterial ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options once circulation is restored:
    a. Autolytic
    b. Enzymatic
    c. Surgical
    d. Other (Bradley, Cullum, & Sheldon, 1999) [Level C]
8. Debride diabetic foot ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options:
    a. Autolytic (Mulder, 1995; Edwards & Stapley, 2010; WOCN, 2012) [Level A]
    b. Enzymatic (Edwards & Stapley, 2010; WOCN, 2012) [Level C]
    c. Surgical (Saap & Falanga, 2002; Steed et al., 1996, Brem et al., 2006; WOCN, 2012) [Level B]
    d. Other (Bradley, Cullum, & Sheldon, 1999, Edwards & Stapley, 2010) [Level A]
9. Debride pressure ulcers with more than 25% necrotic tissue in the wound allowing professionals to select among these options:
    a. Autolytic (Mulder, 1995; Bradley, Cullum, & Sheldon, 1999; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level A]
    b. Enzymatic (Alvarez et al., 2002; Bradley, Cullum, & Sheldon, 1999; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level C]
    c. Surgical (Bradley, Cullum, & Sheldon, 1999; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level C]
    d. Other (Bradley, Cullum, & Sheldon, 1999; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level A]
10. Debride acute wounds with more than 25% necrotic tissue in the wound allowing professionals to select among these options:
    a. Autolytic (Mulder, 1995; National Institute for Clinical Excellence [NICE], 2001; Smith et al.,2013)
    b. Enzymatic (Sieggreen & Maklebust, 1997; Smith et al., 2013)
    c. Surgical (Smith et al., 2013)
    d. Other (Bradley, Cullum, & Sheldon, 1999) [Level B]
11. After debriding any chronic or acute wound, before dressing the wound, obtain hemostasis if bleeding occurs (Sørenson, Jergensøn, &

Gottrup, 2004; Bergstrom et al., 1994). [Level C]

12. Describe surgical or sharp debridement of any chronic or acute wound as the removal of devitalized tissue using a scalpel, scissors or other sharp instrument (Edwards & Stapley, 2010; NICE, 2001; Bergstrom et al., 1994). [Level B]
13. Note the following with surgical or sharp debridement of any chronic or acute wound:
    a. Procedure to be performed only by healthcare professionals who have demonstrated the clinical skills and who meet the relevant licensing requirements (Bradley, Cullum, & Sheldon, 1999; Smith et al., 2013). [Level B]
    b. Before dressing the wound, obtain hemostasis if bleeding occurs (Sørenson, Jergensøn, & Gottrup, 2004; Bergstrom et al., 1994). [Level C]
14. Options for cleansing any chronic or acute wound include:
    a. Pulsatile lavage, normal saline or other nonâ€toxic wound cleansers such as Shurâ€Clens®, Biolex™ or Irriclens® (Bergstrom et al., 1994; Rodeheaver et al., 1980; Morris, Dowlen, & Cullen, 1994; Moore & Cowman, 2013). [Level B]
15. If the plan of care suggests use of a moisture retentive primary or secondary dressing, include as options: DuoDERM® CGF®, DuoDERM® CGF® Extra Thin or Comfeel: Plus® Ulcer Dressings:
    a. For any chronic wound (Chaby et al., 2007): diabetic foot ulcers (Boulton, Meneses, & Ennis, 1999; Laing, Cogley, & Klenerman, 1992; Brem et al., 2006); pressure ulcers (AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010; Bouza et al., 2005; de Laat, Scholte op Reimer, & van Achterberg, 2005; Jones & Fennie, 2007; Smitten & Bolton, 2005; Bradley et al, 1999; Cullum & Petherick, 2007; Health Quality Ontario, 2009); pressure and venous ulcers (Kerstein et al., 2001); radiated skin conditions (Mak et al., 2000; Petersen et al., 1991); venous ulcers (O'Donnell & Lau, 2006) [Level A]
    b. For acute wounds (Goetze et al., 2006; Heffernan & Martin, 1994; Hoffman et al., 1995; Madden et al., 1989; Murharyo, 1996; Nemeth et al., 1991; Schmidt et al., 1996; Wiechula, 2003; Wasiak et al., 2012; Tan, Roberts, & Sinclair, 1993) [Level A]
16. If the plan of care suggests use of an absorption dressing, include as options: CombiDERM® ACD™ or other Island Dressing, AQUACEL® Hydrofiber® Dressing or Kaltostat® calcium sodium alginate dressing on:
    a. Any chronic wound (Bergstrom et al., 1994; Armstrong & Ruckley, 1997; Harding et al., 2001; Lyon et al., 1998; Piaggesi et al., 2001; Jude et al., 2007; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010; Health Quality Ontario, 2009) [Level A]
    b. Acute wounds. (Kogan et al., 2004; Barnea et al., 2004; Foster & Moore, 1997) [Level A]
17. If the plan of care suggests use of a hydration product on any chronic or acute wound, include as options: SAFâ€Gel™, DuoDERM® Hydroactive® Gel or IntraSite® Gel (Ohura, Sahada, & Mino, 2004; Hutchinson & Lawrence, 1991; Romanelli, 1997; Wasiak et al., 2012; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010; Health Quality Ontario, 2009). [Level A]
18. If the plan of care suggests debridement and an enzymatic debridement method, is chosen, include as options: Santyl®, Accuzyme® or Panafil® (Burgos et al., 2000; Alvarez et al., 2002). [Level A]
19. Assessment of any acute or chronic wound includes the following:
    a. "None" or "No undermining", "None" or "No peripheral tissue induration", "None" or "No edema" (Bolton et al., 2004; AAWC, "Association for the Advancement of Wound Care guideline of pressure ulcer guidelines," 2010) [Level C]

Relevance of Selected Wound Assessment and Patient Care Recommendations to Evidence-Based Care

1. The wound assessment and patient care recommendations support evidence-based care for patients with acute and chronic wounds, including pressure ulcers, venous ulcers, mixed arterial/venous ulcers, and diabetic foot ulcers (Beitz & van Rijswijk, 1999, 2010, 2012; Bolton et al., 2004; Jones & Fennie, 2007). [Level B]

Definitions:

Evidence Criteria and Definitions for Solutions® Algorithms Recommendations Evidence Base

A. Results of two or more randomized controlled trials (RCTs) in humans or a literature review (LR) or metaâ€analysis (MA) containing same provide support of efficacy. For assessment and diagnosis recommendations or risk analysis of likely outcomes: two or more prospective cohort (CO) studies
B. Results of two or more historically controlled trials (HCTs) or case controlled trials (CCTs) or a HCT or CCT provide support of efficacy plus:
    1. One RCT in humans or a LR or MA containing same
    2. For assessment and diagnosis recommendations or risk analysis of likely outcomes: two or more prospective CO studies
    3. Or when appropriate, results of two or more RCTs in an animal model validated as clinically relevant to the acute or chronic wound discussed and/or retrospective case series (RCS) provide indirect support
C. This rating requires one or more of the following:

- C1: Results of one controlled trial (e.g., RCT, CCT or HCT) (or for assessment and diagnosis recommendations or risk prediction one prospective CO study)
- C2: Results of at least two case series (CS) or descriptive studies or a retrospective cohort study in humans
- C3: Expert opinion (EO)

Adapted from AHRQ (Formerly AHCPR) Pressure Ulcer (PU) Treatment Guidelines Levels of Evidenceâ€â€modified for generality to all chronic wounds.

Clinical Algorithm(s)

The following algorithms are provided at the ConvaTec Web site:

- Dry wound, minimal moisture: ≤25% necrotic tissue/fibrin slough
- Dry wound, minimal moisture: >25% necrotic tissue/fibrin slough
- Moist-lightly exuding: ≤25% necrotic tissue/fibrin slough
- Moist-lightly exuding: >25% necrotic tissue/fibrin slough
- Moist-moderately exuding: ≤25% necrotic tissue/fibrin slough
- Moist-moderately exuding: >25% necrotic tissue/fibrin slough
- Wet-heavily exuding: ≤25% necrotic tissue/fibrin slough
- Wet-heavily exuding: >25% necrotic tissue/fibrin slough

Scope

Disease/Condition(s)

Acute and chronic wounds including arterial, diabetic, pressure, venous, or mixed arterial-venous ulcers

Guideline Category

Evaluation

Management

Prevention

Risk Assessment

Treatment

Clinical Specialty

Dermatology

Family Practice

Geriatrics

Internal Medicine

Nursing

Physical Medicine and Rehabilitation

Plastic Surgery

Surgery

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Nurses

Physical Therapists

Physician Assistants

Physicians

Podiatrists

Guideline Objective(s)

- To facilitate health care professionals' decision making by providing stepwise management and evaluation strategies for acute and chronic wound care
- To reduce patient risk factors for delayed wound healing and prevent wound complications

Target Population

Patients with acute and chronic wounds

Interventions and Practices Considered

1. Assessment of wound bed exudate, tissue types, wound dimensions, wound edges, and surrounding skin
2. Assessment for signs and symptoms of infection
3. Cleansing and debridement of wound (autolytic, enzymatic, or surgical debridement)
4. Wound dressing (moisture retentive dressing, wound hydration)
5. Reduction of risk factors for developing chronic ulcers and delayed healing, including a preventative patient care plan
6. Patient education and support
7. Treatment of infection, as needed
8. Assessment and management of wound pain and odor

Major Outcomes Considered

- Pressure ulcer incidence
- Wound healing time or percent healed
- Complication rate

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The development of the initial algorithms, and their subsequent content validation in 2001, was based on evidence obtained from Medline and CINHAL literature searches for the time period between 1992 and 2001. The Medline search was updated again in 2005, covering the period 2001-2005. No further changes to the algorithm were required as a result of that search.

For the 2008 update, MEDLINE® and Cochrane databases were searched systematically for all relevant subject terms in each covering the period 2006-2008. Up to 3 of the best available references were used for each relevant recommendation.

2013 Update Procedures

A targeted literature search to identify publications with the highest levels of evidence was conducted.

Cochrane Library: A broad search of the Cochrane library was conducted. Search strategy: *Reviews*; Keyword, title or abstract contains: *wound* or *ulcer*. All reviews were considered and, if appropriate and published between 2009 and 2013, the evidence and reference in the guideline was updated. Two previously used Cochrane intervention reviews were updated and two new reviews were available and included in the evidence summary. The strength of one recommendation related to diabetic foot ulcer supportive care changed from "C" to "B" level evidence. No other intervention reviews containing important evidence for algorithm steps or themes were identified.

National Guideline Clearinghouse: Current (2009-2013) clinical practice guidelines were identified using the search terms "wound", "dressings", or "ulcers". Updated or newly available guidelines were identified, reviewed, and included in the evidence summary. Levels of evidence did not change.

Medline: Search terms used: meta-analysis *and* pressure ulcer, *or* venous ulcer, *or* diabetic foot ulcer, *or* arterial ulcer, *or* burn wounds *or* surgical wounds (limit Jan. 2009-Sept. 2013). Only one new (pressure ulcer) meta-analysis with relevant results was identified and included in the evidence summary. Level of evidence did not change. Most searches yielded duplicate publications (Cochrane database).

Hand Search: Two publications supporting the content validity of the algorithms were added. One details a content validation study of the algorithms when used by non-wound-expert nurses. The second study describes the development and testing of an on-line interactive program designed to help non-wound-experts provide evidence-based wound care using algorithms and wound photographs.

Number of Source Documents

51

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Evidence Criteria and Definitions for Solutions® Algorithms Recommendations Evidence Base

A. Results of two or more randomized controlled trials (RCTs) in humans or a literature review (LR) or metaâ€analysis (MA) containing same provide support of efficacy. For assessment and diagnosis recommendations or risk analysis of likely outcomes: two or more prospective cohort (CO) studies
B. Results of two or more historically controlled trials (HCTs) or case controlled trials (CCTs) or a HCT or CCT provide support of efficacy plus:
    1. One RCT in humans or a LR or MA containing same
    2. For assessment and diagnosis recommendations or risk analysis of likely outcomes: two or more prospective CO studies
    3. Or when appropriate, results of two or more RCTs in an animal model validated as clinically relevant to the acute or chronic wound

discussed and/or retrospective case series (RCS) provide indirect support

C. This rating requires one or more of the following:
   - C1: Results of one controlled trial (e.g., RCT, CCT or HCT) (or for assessment and diagnosis recommendations or risk prediction one prospective CO study)
   - C2: Results of at least two case series (CS) or descriptive studies or a retrospective cohort study in humans
   - C3: Expert opinion (EO)

Adapted from AHRQ (Formerly AHCPR) Pressure Ulcer (PU) Treatment Guidelines Levels of Evidenceâ€â€modified for generality to all chronic wounds.

Methods Used to Analyze the Evidence

Review

Review of Published Meta-Analyses

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Not stated

Rating Scheme for the Strength of the Recommendations

Not applicable

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

Clinical Validation-Trial Implementation Period

External Peer Review

Description of Method of Guideline Validation

Validation of Original Algorithms

Each step in the original Solutions® algorithms was formally content validated by wound care professionals (44 wound care nurses in 1998–1999). The final version was again content validated by a multidisciplinary group of 21 invited global opinion leaders in wound care, including physicians of varying specialties, nurses, and other wound care specialists. Subsequently, using a standardized content validation process and photographs of acute and chronic wounds, content validity of algorithm components and the ability of non-wound care experts to correctly, validly, and reliably select the most appropriate algorithm and treatment (construct validity and reliability) was established in a study involving 204 registered nurses.

This process also measured clinical healing outcomes during real-world use of the algorithms.

See the "Availability of Companion Documents" field.

Validation of Current Version

Members of the Guideline Task Force of the Association for the Advancement of Wound Care were invited to review the algorithms, the supporting evidence, and the process used to develop them using the AGREE® II Instrument.

The group met in April 2012 at a National Wound Care Conference. Following a brief introduction about the process, wound experts reviewed the Algorithms and all accompanying recommendations/levels of evidence as available at www.guideline.gov and completed the AGREE II instrument. All responses were anonymous and conflict of interest statements were signed. Seven volunteers completed the instrument. Only two of the six domains had a score <83%. Specifically, domain 2 (stakeholder involvement - especially patients) received a score of 75% and domain 6 (editorial independence) received a score of 63%. Five reviewers indicated they would adopt the algorithms in practice.

Evidence Supporting the Recommendations

References Supporting the Recommendations

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Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Appropriate wound management and evaluation strategies
- Appropriate implementation of chronic wound risk factor assessment and risk reduction programs and interventions
- Prevention of wound complications
- Improved rates of wound healing

Potential Harms

Not stated

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Mobile Device Resources

Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

ConvaTec. SOLUTIONSÂ® wound care algorithm. Princeton (NJ): ConvaTec; 2013 Sep. 16 p. [103 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

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ConvaTec - For Profit Organization

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Not stated

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Not stated

Financial Disclosures/Conflicts of Interest

Conflict of interest statements were signed by all members of the guideline task force. One participant declared a potential conflict of interest related to distributing wound care products. Participants volunteered their time and expertise. No compensation for participation was provided.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: ConvaTec. SOLUTIONS wound care algorithm. Princeton (NJ): ConvaTec; 2008. 8 p.

Guideline Availability

Electronic copies: Not available at this time.

Print copies: Available from the ConvaTec Information Center: 1-800-422-8811.

Availability of Companion Documents

The following are available:

- Beitz JM, van Rijswijk L. Using wound care algorithms: a content validation study. J Wound Ostomy Continence Nurs. 1999 Sep;26(5):238-9, 241-9. (Literature ID: #US-06-1300)
- Beitz JM, van Rijswijk L. A cross-sectional study to validate wound care algorithms for use by registered nurses. Ostomy Wound Management 2010;56(4):46-59.
- Beitz JM, van Rijswijk L. Development and validation of an online interactive, multimedia wound care algorithms program. J Wound Ostomy Continence Nurs. 2012 Jan-Feb;39(1):23-34
- Bolton L, McNees P, van Rijswijk L, de Leon J, Lyder C, Kobza L, Edman K, Scheurich A, Shannon R, Toth M; Wound Outcomes Study Group. Wound-healing outcomes using standardized assessment and care in clinical practice. J Wound Ostomy Continence Nurs. 2004 Mar-Apr;31(2):65-71. (Literature ID: #US-07-1013)
- Evidence base for content-validated recommendations underlying Solutions® algorithm. Princeton (NJ): ConvaTec; 2014. 16 p.
- Solutions® algorithms for skin and wound care: customer implementation guide. Princeton (NJ): ConvaTec; 2007 Dec. 4 p. (Literature ID: #US-07-2119)

Print copies: Available from the ConvaTec Information Center: 1-800-422-8811.

A mobile app for iOS and Android is available from the ConvaTec Web site .

Patient Resources

None available

NGC Status

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